Convert DCC Four-digit (Long Address) To
Program Individual Values For CV17 and CV18

By Scott Kurzawski
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To convert a DCC four-digit or long address to two individual bytes of data for CV17 and CV18 then you can use following method. First, in order for the loco to recognize a four-digit address you have to enable that feature when programming CV29.   If you do not enable the use of four-digit addressing in CV29 [bit-5], then the loco will only respond to short addresses (0 – 127). The factory default is to use the short address.

One-way is to program the four-digit address manually, that is in Ops mode programming or "Programming on the main" (not the programming track) to program CV17 and CV18 individually. CV17 is the high byte and CV18 is the low byte of the four-digit address. To do this, you first have to convert your 4-digit address into two single bytes of data, one byte for each CV. The easiest way to do this conversion is to use the Windows Calculator program that comes loaded on your PC.
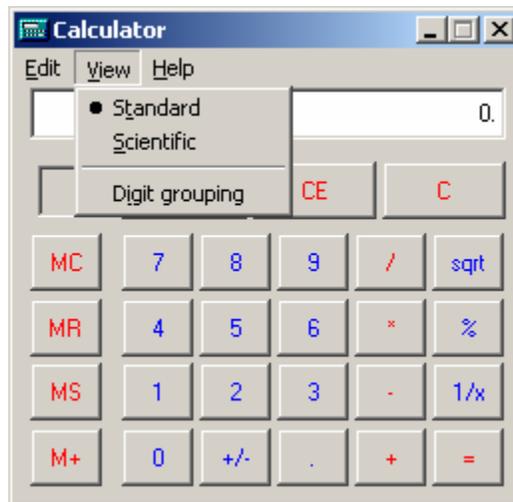
Click <Start>
Click <Run>
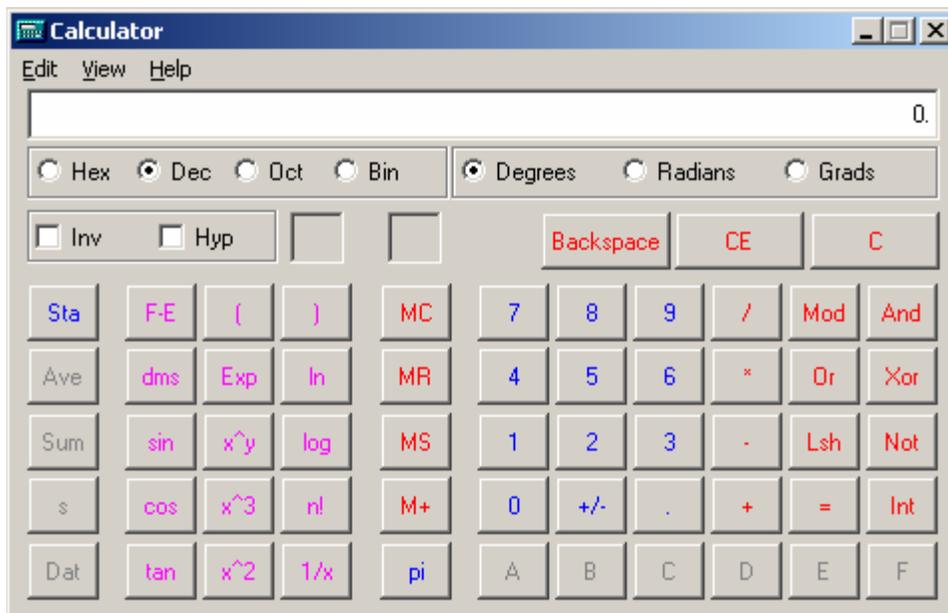A little dialog box will appear, so type "calc" or "calculator" [no quotes] in the edit box and click <OK>

The calculator program will then appear.
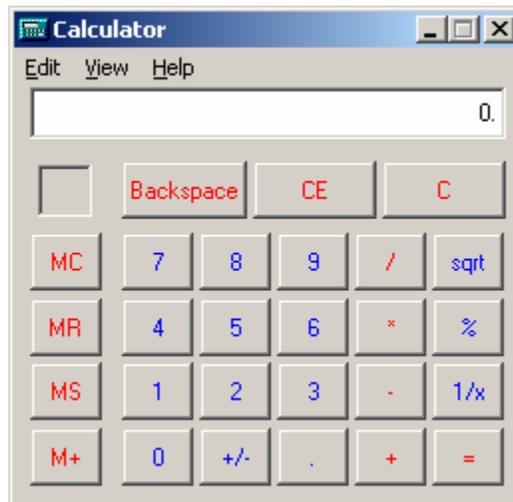
Next, change the view to the "Scientific" mode so we can do conversions between decimal and hexadecimal.

Click on "Scientific", which will open the following view of the calculator program:

Notice the four bullet buttons in the upper left hand corner. Pressing either one of these bullets will automatically convert the value in the window to the corresponding numbering system, Hexadecimal (Base 16), Decimal (Base 10), Octal (Base 8), Binary (Base 2).

For example, if I want to convert loco number 6564 to two individual hex bytes for programming CV17 and CV18, do the following. First, make sure the bullet next to "Dec" is clicked, and then type 6564 in the window.
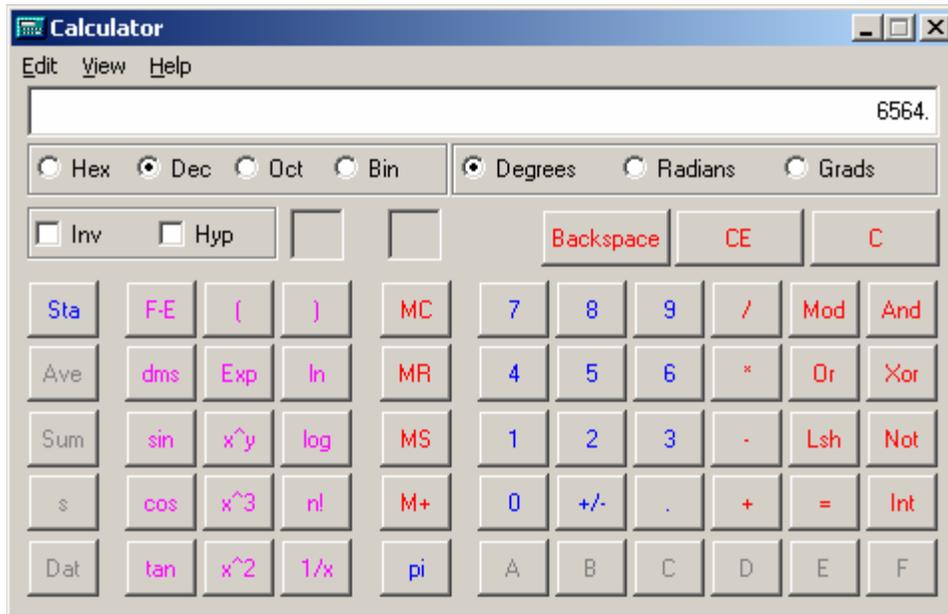
Now click the "Hex" bullet button to convert the input decimal value to a hexadecimal value.
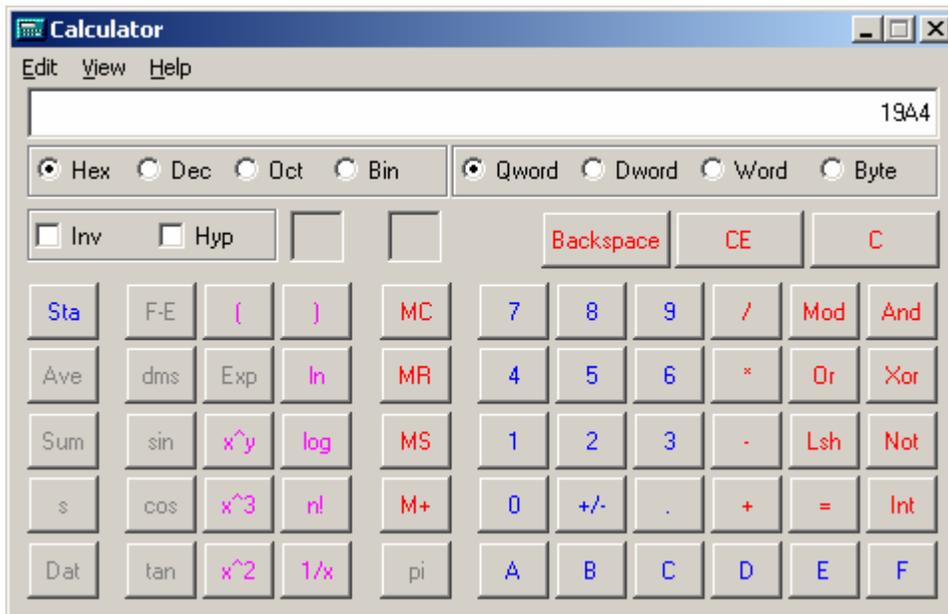
Notice the hexadecimal value is now 19A4. Since the NMRA DCC standard states that bits 6 and 7 (upper 2 bits) are always "ON", then we have to add

decimal 192 (128 + 64) to the high-byte value for CV17. Therefore, to avoid having to do hexadecimal addition; convert the high-byte 0x19 back to decimal and then add 192 to it. Hex 0x19 converted to decimal 25 + 192 = 217. If you are programming with a NCE system, then you can use the value of 217 as-is for CV17; however, if you are using a Digitrax system, then you can convert the 217 decimal value back to hexadecimal. We end up with a hexadecimal value for the high-byte CV17 of D9. The low byte for CV18 would remain unchanged as 0xA4 for Digitrax or converted to decimal for NCE it would be 164.

Remember, single byte hexadecimal values are always in pairs and you always work from **right to left** to get the total number of pairs. Therefore, if you use the calculator program to convert loco number 518 decimal to hex and you would get a hexadecimal value of 206. Therefore, the raw two-byte hex values CV17 and CV18 would be 0x02 (notice we add a leading 0 ahead of the 2 to make it 2 characters long) and 0x06, respectively. But remember, according to the NMRA DCC standard we have to add decimal 192 to the high-byte, so when we convert 0x02 to decimal, we get decimal 2 (no changes in value between hex and decimal if the value is less than 10). Decimal 2 + 192 = 194 and decimal 194 converted to hex is 0xC2, which can then be used for the high byte CV17. Hex 0x06 can remain unchanged for both decimal and hexadecimal representation. Therefore, the low-byte of CV18 would be 6 or 0x06 for both DCC systems.

And that's all there is to converting four-digit addresses to two individual high-byte and low-byte address' for Ops mode programming or individual CV17 and CV18 programming.